SECTION RFD
REAR FINAL DRIVE

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PRECAUTIONS

PFP:00001

Service Notice or Precautions

ADS0015Z

- Check for the correct installation status prior to removal or disassembly. If matching marks are required, be certain they do not interfere with the function of the parts when applied.
- Overhaul should be done in a clean work area, it is preferable to work in dustproof area.
- Before disassembly, using steam or white gasoline, completely remove sand and mud from the exterior of the unit, preventing them from entering into the unit during disassembly or assembly.
- Check appearance of the disassembled parts for damage, deformation, and unusual wear. Replace them with a new ones if necessary.
- Gaskets, seals and O-rings should be replaced any time when the unit is disassembled.
- In principle, tighten bolts or nuts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, observe it.
- Clean and flush the parts sufficiently and blow-dry them.
- Be careful not to damage sliding surfaces and mating surfaces.
- When applying sealant, remove the old sealant from the mounting surface; then remove any moisture, oil, and foreign materials from the application and mounting surfaces.
- Always use shop paper for cleaning the inside of components.
- Avoid using cotton gloves or shop rags to prevent entering of lint.
- During assembly, observe the specified tightening torque, and apply new differential oil, petroleum jelly, or multi-purpose grease as specified for each vehicle, if necessary.

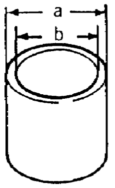
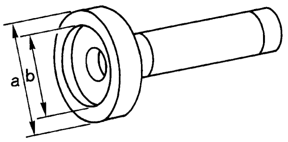
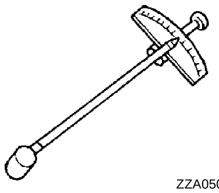
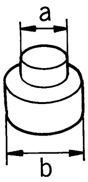
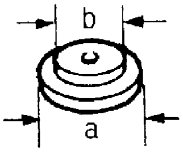
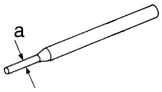
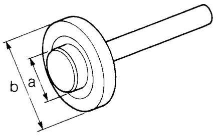
PREPARATION

PFP:00002

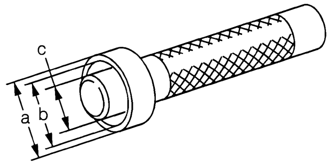
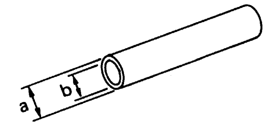
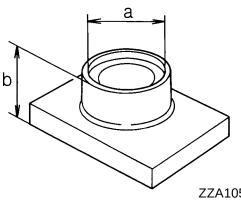
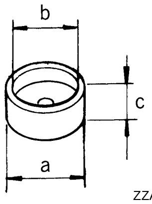
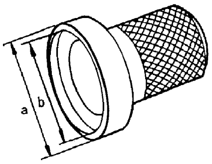
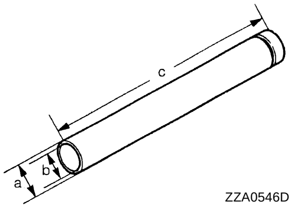
Special Service Tools

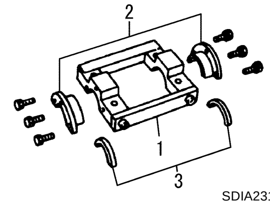
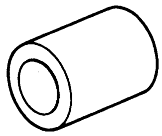
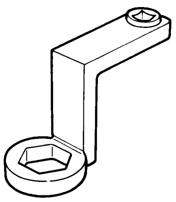
ADS00160

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
ST27861000 (—) Drift a: 62 mm (2.44 in) dia. b: 52 mm (2.05 in) dia.	 ZZA0832D	Installing final drive front oil seal
KV38100200 (J-26233) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.	 ZZA1143D	● Installing final drive front oil seal ● Installing final drive side oil seal
ST3127S000 (J-25765-A) Preload gauge	 ZZA0503D	Measuring preload torque
ST33052000 (—) Drift a: 22 mm (0.87 in) dia. b: 28 mm (1.10 in) dia.	 ZZA1023D	Removing side bearing inner race
KV40100610 (J-26089) Drift a: 63 mm (2.48 in) dia. b: 54.3 mm (2.138 in) dia.	 ZZA0810D	● Removing and installing gear carrier and rear cover (2 pieces are used) ● Installing pinion front bearing inner race
ST23550000 (—) Pin punch a: 4.5 mm (0.177 in) dia.	 NT410	Removing and installing lock pin
ST17130000 (—) Drift a: 31.8 mm (1.252 in) dia. b: 58 mm (2.28 in) dia.	 ZZA0836D	Installing pinion rear bearing outer race

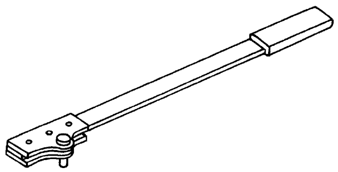
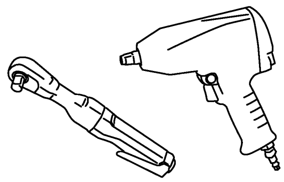
PREPARATION

Tool number (Kent-Moore No.) Tool name	Description
ST33230000 (J-25805-01) Drift a: 51 mm (2.01 in) dia. b: 41 mm (1.61 in) dia. c: 28.5 mm (1.122 in) dia.  ZZA1046D	Installing pinion front bearing outer race
ST23860000 (—) Drift a: 38 mm (1.50 in) dia. b: 33 mm (1.30 in) dia.  ZZA0534D	● Installing pinion rear bearing inner race ● Installing pinion front bearing inner race
ST38220000 (—) Press stand a: 63 mm (2.48 in) dia. b: 65 mm (2.56 in)  ZZA1058D	Installing pinion front bearing inner race
KV40105020 (—) Drift a: 39.7 mm (1.563 in) dia. b: 35 mm (1.38 in) dia. c: 15 mm (0.59 in)  ZZA1133D	Installing side bearing inner race
ST35271000 (J-26091) Drift a: 72 mm (2.83 in) dia. b: 63 mm (2.48 in) dia.  ZZA0814D	Installing center oil seal
ST22360002 (J-25679-01) Drift a: 29 mm (1.14 in) dia. b: 23 mm (0.91 in) dia. c: 150 mm (5.91 in)  ZZA0546D	Installing coupling front bearing

Tool number (Kent-Moore No.) Tool name	Description
KV381086S1 (—) Dummy cover set 1. KV38108610 (—) Dummy cover 2. KV38108621 (—) Dummy cover spacer 3. KV38108630 (—) Dummy cover shim  SDIA2313E	● Checking backlash ● Checking drive gear runout ● Checking tooth contact
KV38108500 (—) Drive pinion socket  ZZA1205D	● Measuring preload torque ● Removing and installing drive pinion nut
KV38108400 (—) Pinion nut wrench  ZZA1206D	● Measuring preload torque ● Removing drive pinion nut

Commercial Service Tools

ADS0018A

Tool name	Description
Flange wrench  NT771	Removing and installing companion flange lock nut
Power tool  PBIC0190E	Loosening nuts and bolts

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ADS00161

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page		Refer to RFD-24, "INSPECTION AFTER DISASSEMBLY" .	Refer to RFD-18, "Tooth Contact" .	Refer to RFD-24, "INSPECTION AFTER DISASSEMBLY" .	Refer to RFD-20, "Backlash" .	Refer to RFD-20, "Companion Flange Runout" .	Refer to RFD-8, "Checking Differential Gear Oil" .	NVH in PR section.	NVH in FAX, RAX, FSU and RSU sections.	NVH in WT section.	NVH in WT section.	NVH in FAX and RAX section.	NVH in BR section.	NVH in PS section.
Possible cause and SUSPECTED PARTS		Gear tooth rough	Gear contact improper	Tooth surfaces worn	Backlash incorrect	Companion flange excessive runout	Gear oil improper	PROPELLER SHAFT	AXLE AND SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×

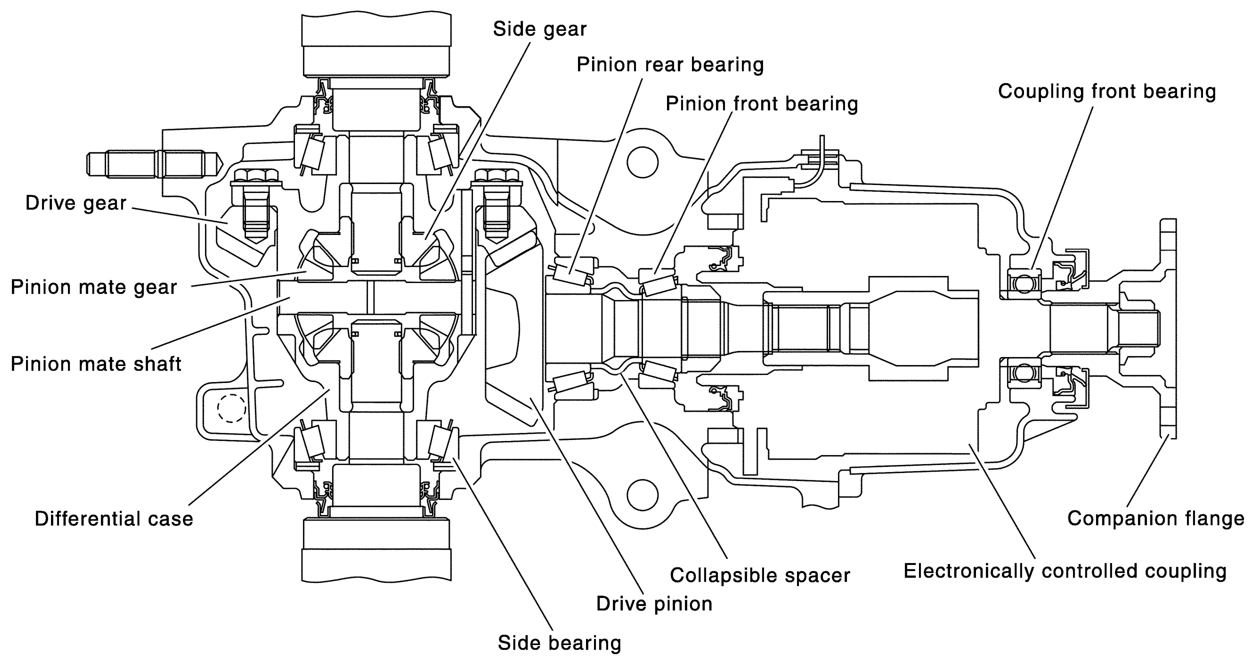
×: Applicable

DESCRIPTION

PFP:00000

Cross-Sectional View

ADS0018B



DIFFERENTIAL GEAR OIL

PFP:KLD30

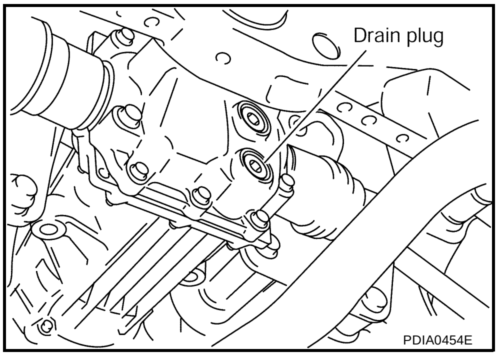
Changing Differential Gear Oil

ADS0018C

DRAINING

1. Stop engine.
2. Remove drain plug and drain oil.
3. Set a gasket on drain plug and install it to final drive assembly and tighten to the specified torque. Refer to RFD-16, "COMPONENTS" .

   CAUTION:
   Do not reuse gasket.



PDIA0454E

FILLING

1. Remove filler plug. Fill with new oil until oil level reaches the specified level near filler plug mounting hole.

   Oil grade and Viscosity:

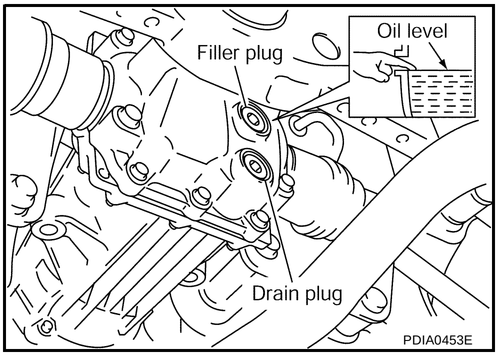
   Refer to MA-11, "Fluids and Lubricants" .

   Oil capacity:

   Approx. 0.55 ℓ (1-1/8 US pt, 1 Imp pt)

2. After refilling oil, check oil level. Set a gasket to filler plug, then install it to final drive assembly. Refer to RFD-16, "COMPONENTS" .

   CAUTION:
   Do not reuse gasket.



PDIA0453E

Checking Differential Gear Oil

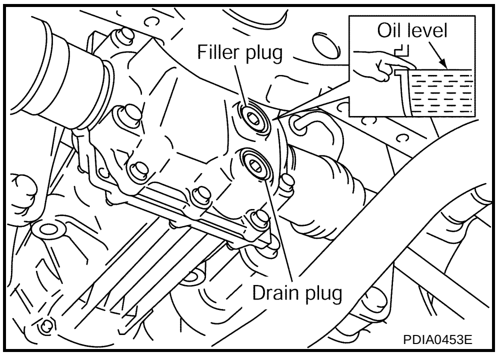
ADS0018D

OIL LEAKAGE AND OIL LEVEL

- Make sure that oil is not leaking from final drive assembly or around it.
- Check oil level from filler plug mounting hole as shown in the figure.

  CAUTION:
  Do not start engine while checking oil level.
- Set a gasket on filler plug and install it on final drive assembly. Refer to RFD-16, "COMPONENTS" .

  CAUTION:
  Do not reuse gasket.



PDIA0453E

FRONT OIL SEAL

PFP:38189

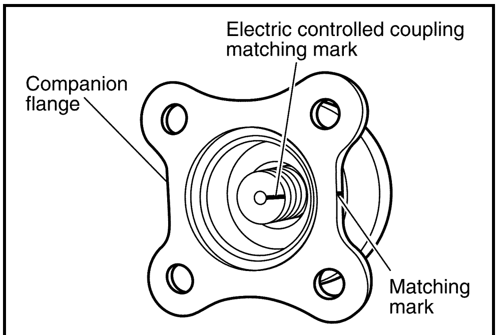
Removal and Installation

ADS0016K

REMOVAL

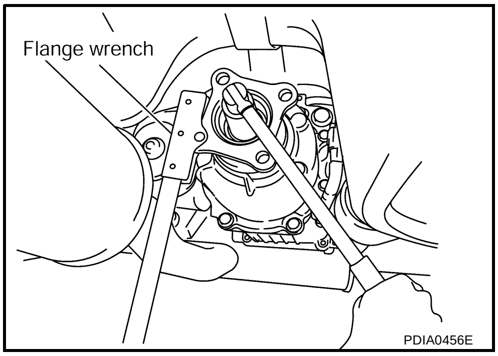
1. Remove propeller shaft. Refer to PR-4, "Removal and Installation" .
2. Put matching mark on the thread edge of electric controlled coupling. The matching mark should be in line with the matching mark on companion flange.

   CAUTION:
   For matching mark, use paint. Do not damage electric controlled coupling.



PDIA0455E

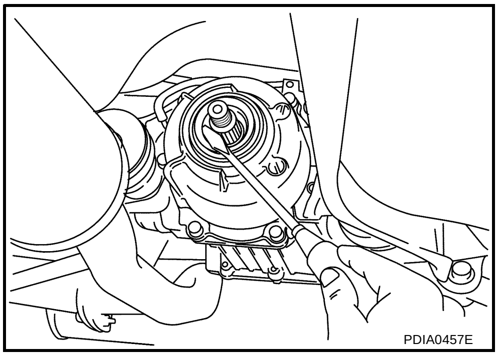
3. Remove companion flange lock nut, using a flange wrench. Then remove companion flange.



PDIA0456E

4. Remove front oil seal from coupling cover, using a flat-bladed screwdriver.

   CAUTION:
   Be careful not to damage coupling cover.

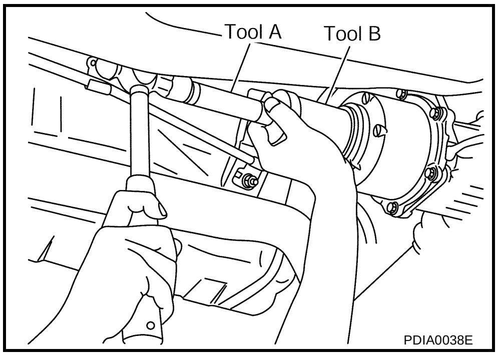

PDIA0457E

INSTALLATION

1. Apply multi-purpose grease to front oil seal lips.
2. Install front oil seal until it becomes flush with the case end, using the drifts.

   Tool number **A: KV38100200 (J-26233)**
   B: ST27861000 (—)

   CAUTION:
   - **Do not reuse oil seal.**
   - **When installing, do not incline oil seal.**

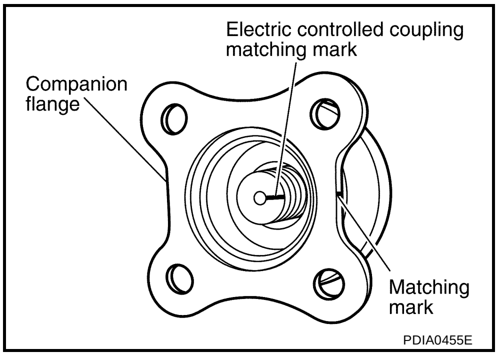


PDIA0038E

3. Align the matching mark of electric controlled coupling with the matching mark of companion flange, then install the companion flange.
4. Install companion flange lock nut with a flange wrench, tighten the to the specified torque. Refer to RFD-16, "COMPONENTS" .

   CAUTION:

   Do not reuse companion flange lock nut.
5. Install propeller shaft. Refer to PR-4, "Removal and Installation" .



SIDE OIL SEAL

PFP:38343

Removal and Installation

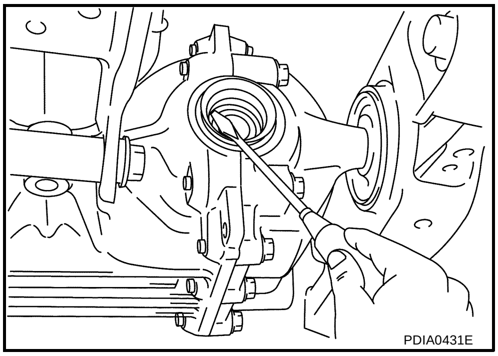
ADS0016L

REMOVAL

1. Remove rear drive shaft with power tool. Refer to RAX-20, "REAR DRIVE SHAFT" .
2. Remove side oil seal, using a flat-bladed screwdriver.

   CAUTION:

   Be careful not to damage gear carrier and rear cover.



PDIA0431E

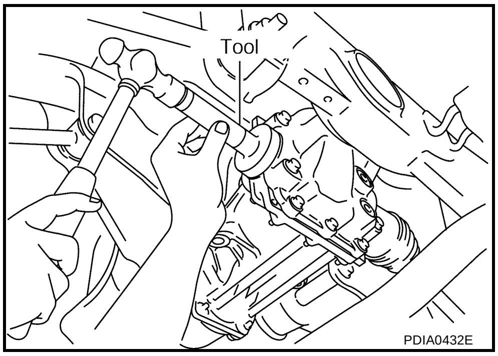
INSTALLATION

1. Apply multi-purpose grease to side oil seal lips.
2. Install side oil seal until it becomes flush with the case end, using the drift.

   Tool number : KV38100200 (J-26233)

   CAUTION:

   - **Do not reuse oil seal.**
   - **When installing, do not incline oil seal.**
3. Install rear drive shaft. Refer to RAX-20, "REAR DRIVE SHAFT" .



PDIA0432E

ELECTRIC CONTROLLED COUPLING

PFP:38760

Removal and Installation

ADS0018E

REMOVAL

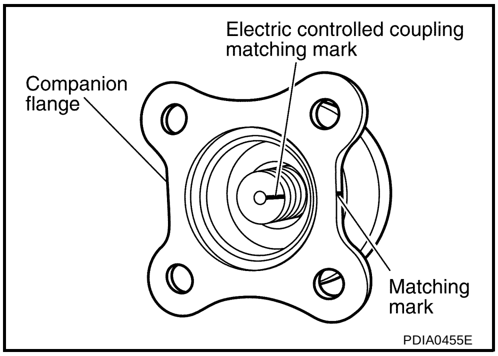
1. Remove propeller shaft. Refer to PR-4, "Removal and Installation" .
2. Put matching mark on the thread edge of electric controlled coupling. The matching mark should be in line with the matching mark on the companion flange.

   CAUTION:

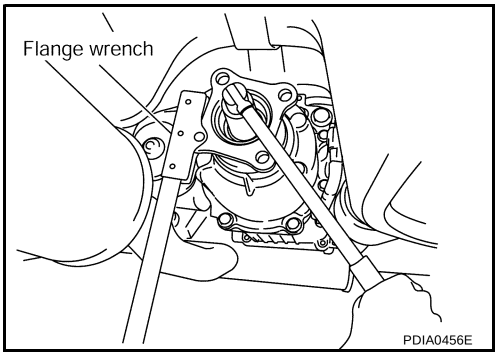
   For matching mark, use paint. Do not damage electric controlled coupling.

   NOTE:

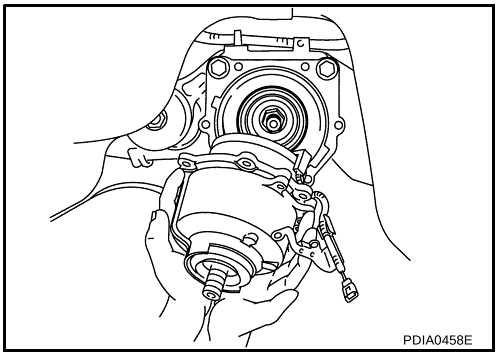
   When replacing electric controlled coupling, matching mark is not necessary.



3. Remove companion flange lock nut, using a flange wrench.
4. Remove companion flange.
5. Disconnect AWD solenoid harness connector and remove connector bracket.
6. Remove electric controlled coupling breather hose from coupling cover.



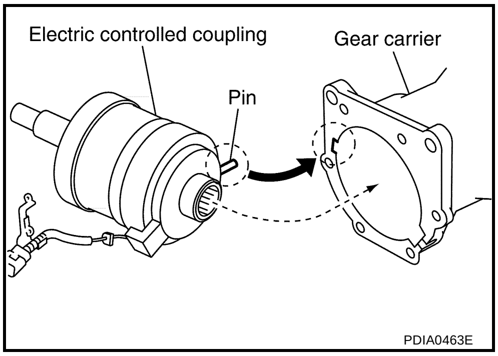
7. Remove coupling cover with electric controlled coupling from gear carrier.
8. Remove electric controlled coupling from coupling cover.



INSTALLATION

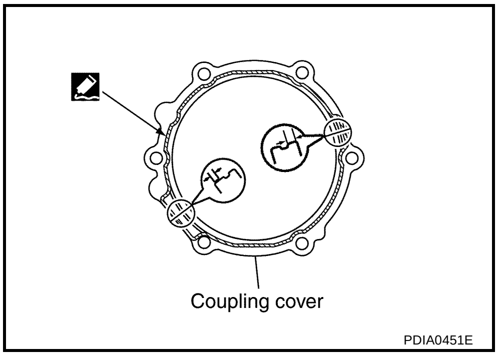
1. Install electric controlled coupling to spline of drive pinion inside gear carrier.

   CAUTION:
   - **Align the pin on electric controlled coupling with the groove of gear carrier.**
   - **Be careful not to damage center oil seal.**

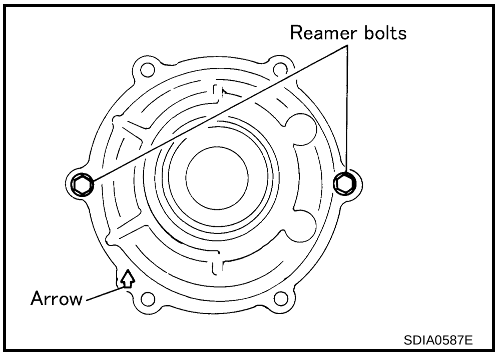


2. Set AWD solenoid harness guide to gear carrier.
3. Apply liquid gasket to mating surface of coupling cover. Overlap both ends of the bead for at least 3 mm (0.12 in).
   - **Use Genuine Silicone RTV or equivalent. Refer to GI-48, "RECOMMENDED CHEMICAL PRODUCTS AND SEAL-ANTS" .**

   CAUTION:
   Remove old sealant adhering to the mounting surfaces. Also remove any moisture, oil, or foreign material adhering to the mounting surfaces.



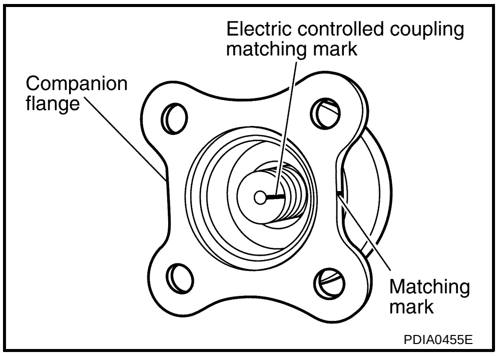
4. Install coupling cover to gear carrier with arrow facing upward, temporarily tighten reamer bolts to the positions shown in the figure.
5. Tighten reamer bolts and coupling cover mounting bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .
6. Install electric controlled coupling breather hose to coupling cover.
7. Install connector bracket and connect AWD solenoid harness connector.



8. Install companion flange.

   NOTE:
   When reusing electric controlled coupling, align the matching mark of electric controlled coupling with the matching mark of companion flange, then install companion flange.
9. Install companion flange lock nut with flange wrench, tighten to the specified torque. Refer to RFD-16, "COMPONENTS" .

   CAUTION:
   Do not reuse companion flange lock nut.
10. Install propeller shaft. Refer to PR-4, "Removal and Installation" .



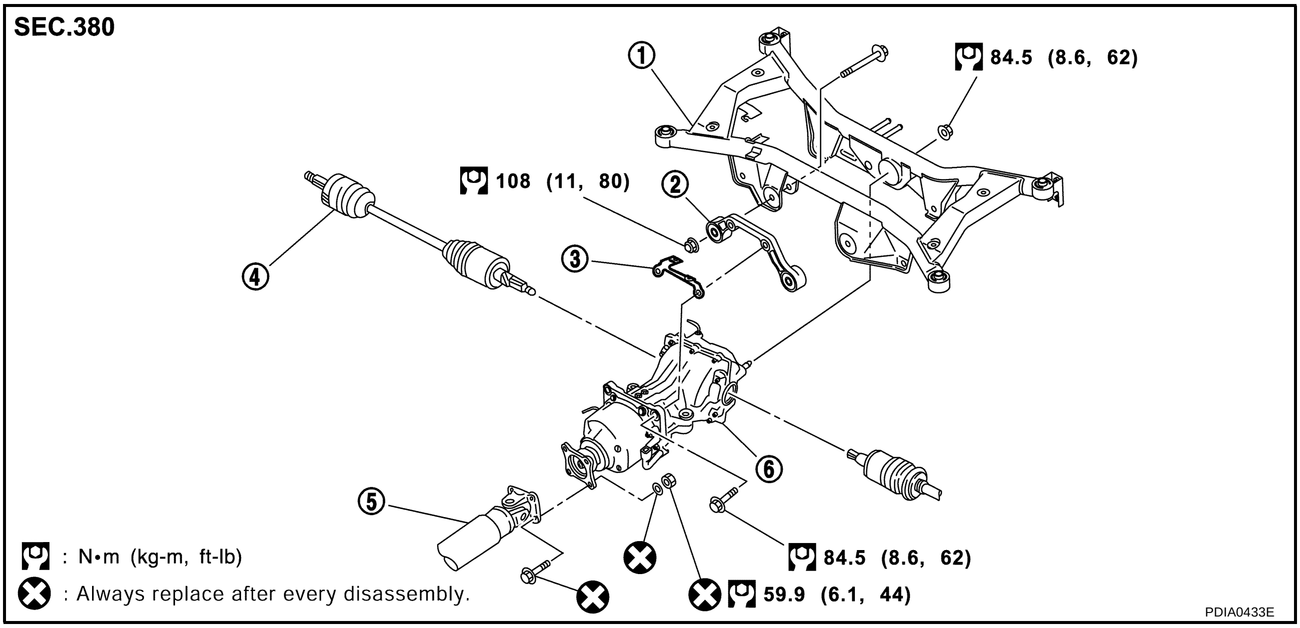
REAR FINAL DRIVE ASSEMBLY

PFP:38300

Removal and Installation

ADS00166

COMPONENTS

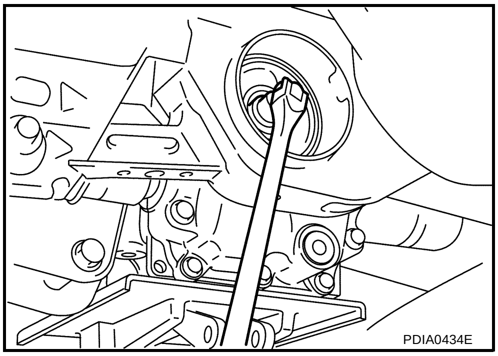


PDIA0433E

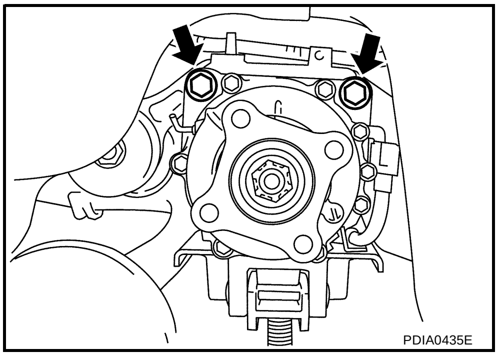
1.	Rear suspension member	2.	Final drive mounting bracket	3.	Harness bracket
4.	Drive shaft	5.	Propeller shaft	6.	Rear final drive assembly

REMOVAL

1. Remove propeller shaft. Refer to PR-4, "Removal and Installation" .
2. Remove drive shaft with power tool. Refer to RAX-20, "Removal and Installation" .
3. Disconnect AWD solenoid harness connector.
4. Remove rear final drive breather hose and electric controlled coupling breather hose.
5. Support rear final drive assembly with a suitable jack.
6. Remove rear final drive mounting nut at rear suspension member.


PDIA0434E

7. Remove rear final drive mounting bolts at final drive mounting bracket, and then remove rear final drive assembly.
   If necessary, remove final drive mounting bracket.
   CAUTION:
   Secure rear final drive assembly to a suitable jack while removing it.


PDIA0435E

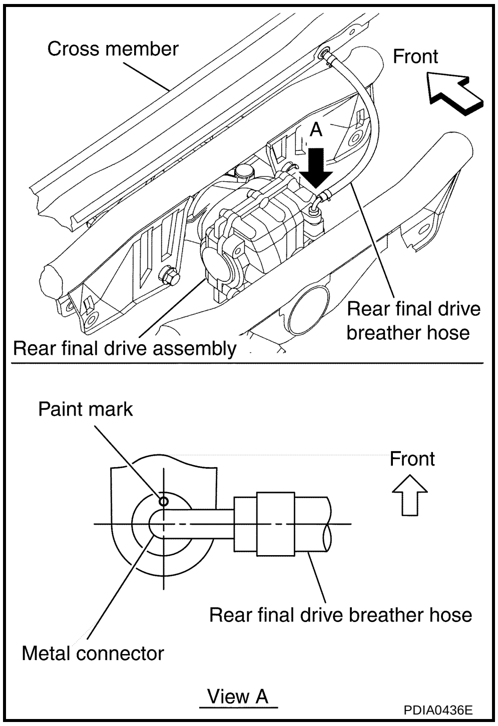
INSTALLATION

Note the following, and install in the reverse order of removal.

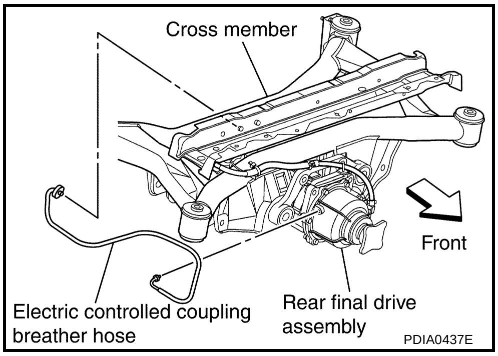
- Refer to RFD-14, "COMPONENTS" about each tightening torque.
- When installing breather hoses, refer to the figure and following.

  CAUTION:
  Make sure there are no pinched or restricted areas on the breather hose caused by bending or winding when installing it.

  – For installation of rear final drive breather hose, the vehicle side end shall be inserted to cross member. Install metal connector side of this hose to rear cover by inserting it with aiming painted marking to the front of vehicle.



  – For installation of electric controlled coupling breather hose, the vehicle side end shall be inserted to cross member. Install its metal tube to rear final drive assembly and direct the metal tube hose side end to the front of vehicle.

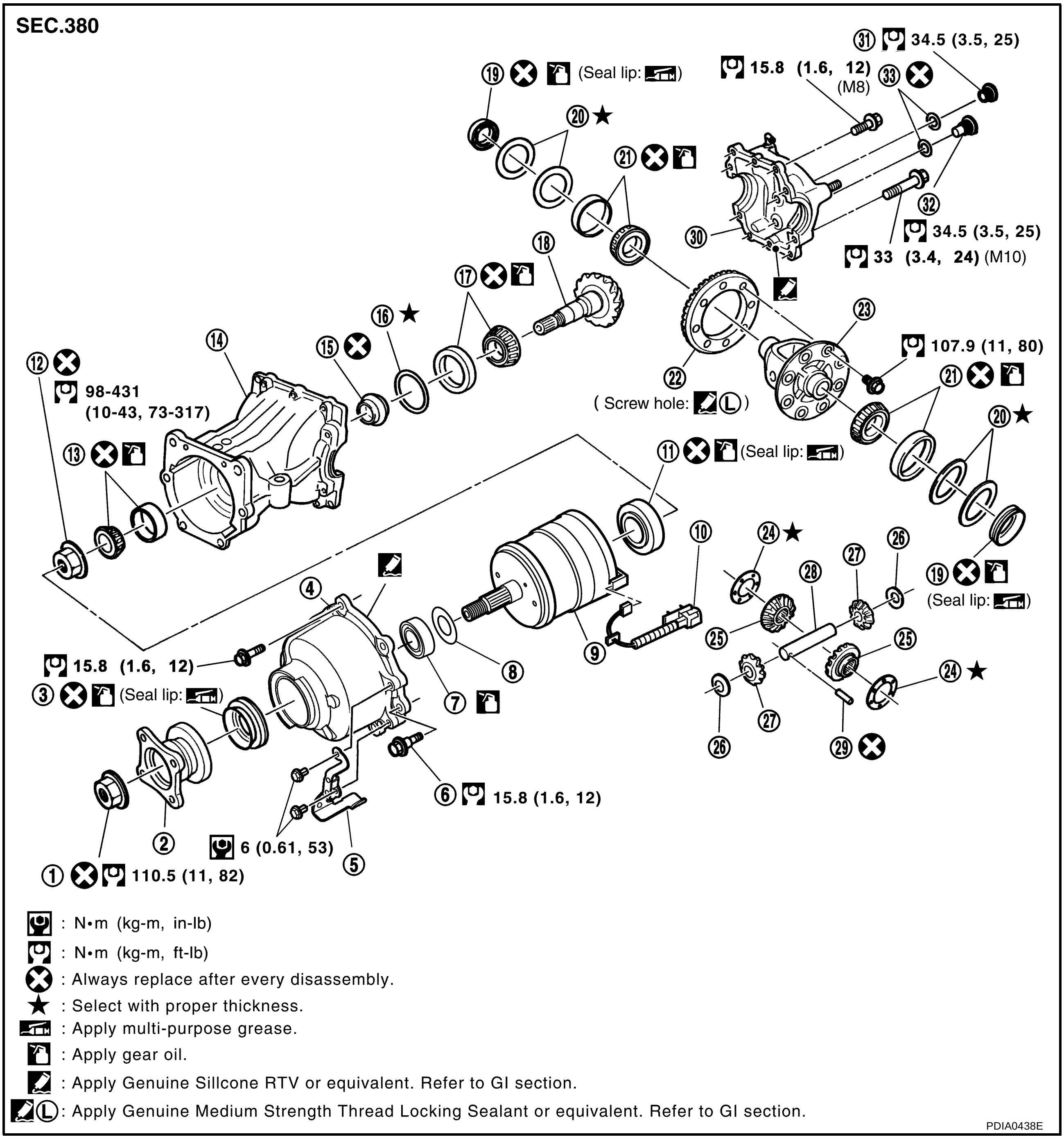


- When oil leaks while removing final drive assembly, check oil level after the installation. Refer to RFD-8, "Checking Differential Gear Oil" .

Disassembly and Assembly

ADS00169

COMPONENTS

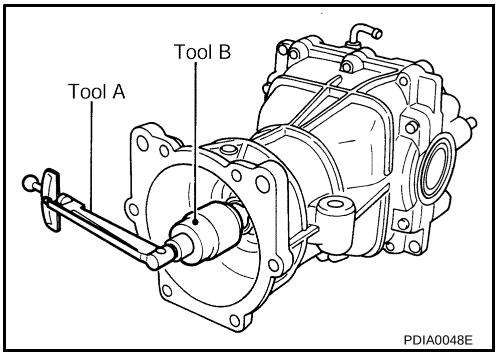


1. Companion flange lock nut	2. Companion flange	3. Front oil seal
4. Coupling cover	5. Connector bracket	6. Reamer bolt
7. Coupling front bearing	8. Bearing shim	9. Electric controlled coupling
10. AWD solenoid harness	11. Center oil seal	12. Drive pinion nut
13. Pinion front bearing	14. Gear carrier	15. Collapsible spacer
16. Drive pinion adjusting shim	17. Pinion rear bearing	18. Drive pinion
19. Side oil seal	20. Side bearing adjusting shim	21. Side bearing
22. Drive gear	23. Differential case	24. Side gear thrust washer
25. Side gear	26. Pinion mate thrust washer	27. Pinion mate gear
28. Pinion mate shaft	29. Lock pin	30. Rear cover
31. Filler plug	32. Drain plug	33. Gasket

ASSEMBLY INSPECTION AND ADJUSTMENT

Total Preload Torque

1. Remove electric controlled coupling assembly. Refer to RFD-21, "Electric Controlled Coupling Assembly" .
2. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
3. Rotate drive pinion at least 20 times to check for smooth operation of the bearing.
4. Fit drive pinion socket onto drive pinion spline. Measure the total preload, using the preload gauge.



Tool number **A: ST3127S000 (J-25765-A)**
B: KV38108500 (—)

Total preload torque:
1.33 - 2.15 N·m (0.14 - 0.21 kg-m, 12 - 19 in-lb)

NOTE:
Total preload torque = Pinion bearing torque + Side bearing torque

- If measured value is out of the specification, disassemble it to check and adjust each part. Adjust the pinion bearing preload and side bearing preload.
  Adjust the pinion bearing preload first, then adjust the side bearing preload.

When the preload torque is large

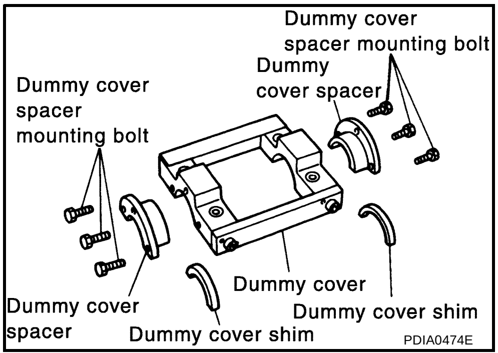
On pinion bearings: **Replace the collapsible spacer.**
On side bearings: **Use thinner side bearing adjusting shims. Refer to RFD-35, "Side Bearing Adjusting Shim" .**

When the preload is small

On pinion bearings: **Tighten the drive pinion nut.**
On side bearings: **Use thicker side bearing adjusting shims. Refer to RFD-35, "Side Bearing Adjusting Shim" .**

Drive Gear Runout

1. Remove rear cover. Refer to RFD-22, "Differential Assembly" .
2. Following the procedure below, install a dummy cover set to gear carrier.



Tool number **: KV381086S1 (—)**

a. Set dummy cover shims to the right and left side bearing adjusting shims.
b. Temporarily tighten dummy cover to gear carrier.
c. Position dummy cover spacer to dummy cover.
d. Tighten rear cover mounting bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .
e. Tighten dummy cover spacer mounting bolts evenly to the specified torque.

: 5.9 N·m (0.6 kg-m, 52 in-lb)

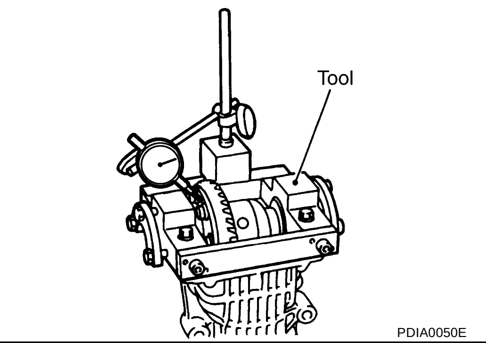
3. Fit a dial indicator to the drive gear back face.
4. Rotate the drive gear to measure runout.

Runout limit: 0.05 mm (0.0020 in) or less

- If the runout is outside of the repair limit, check drive gear assembly condition; foreign material may be caught between drive gear and differential case, or differential case or drive gear may be deformed, etc.

  CAUTION:

  Replace drive gear and drive pinion gear as a set.



PDIA0050E

Tooth Contact

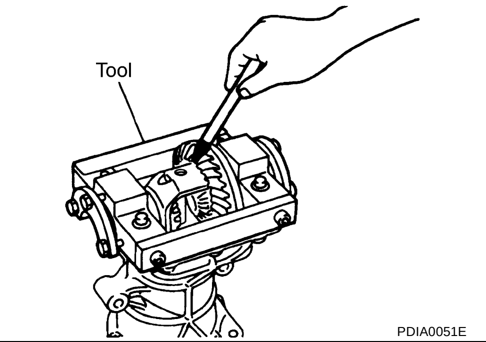
1. Remove rear cover. Refer to RFD-22, "Differential Assembly" .
2. Attach dummy cover set. For dummy cover installation, refer to RFD-17, "Drive Gear Runout" .

Tool number : KV381086S1 (—)

3. Apply red lead to drive gear.

   CAUTION:

   Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on drive gear.

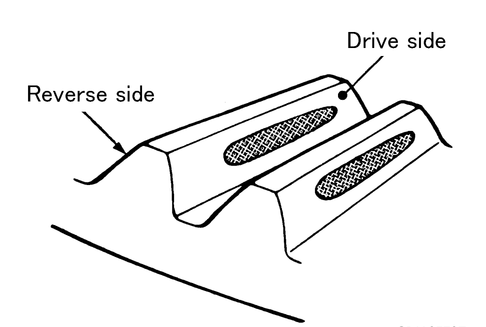


PDIA0051E

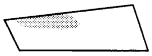
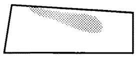
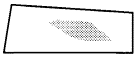
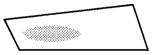
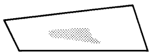
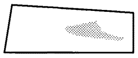
4. Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact.

   CAUTION:

   Check tooth contact on drive side and reverse side.

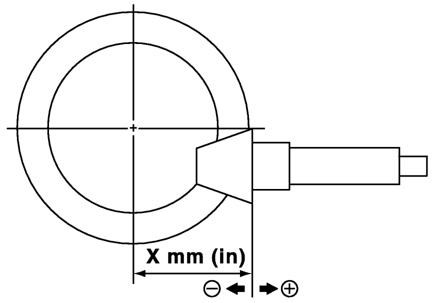


SDIA0570E

Tooth contact condition		Drive pinion adjusting shim selection value [mm (in)]		Adjustment (Yes/No)	Possible cause
Drive side	Back side				
Heel side / Toe side	Toe side / Heel side	Thicker ↑	+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
			+0.06 (+0.0024)		Occurrence of noise when accelerating.
			+0.03 (+0.0012)	No	–
			0		
		Thinner ↓	−0.03 (−0.0012)		
			−0.06 (−0.0024)	Yes	Occurrence of noise at constant speed and decreasing speed.
			−0.09 (−0.0035)		Occurrence of noise and scoring sound in all speed ranges.

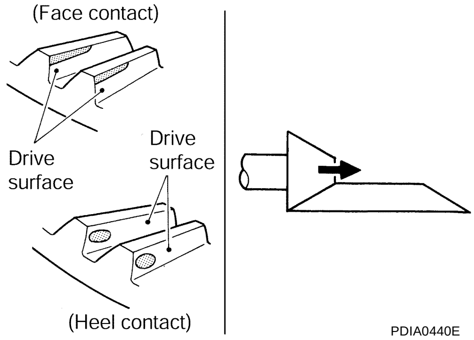
SDIA2549E

5. If tooth contact is improperly adjusted, follow the procedure below to adjust the pinion height (dimension X).



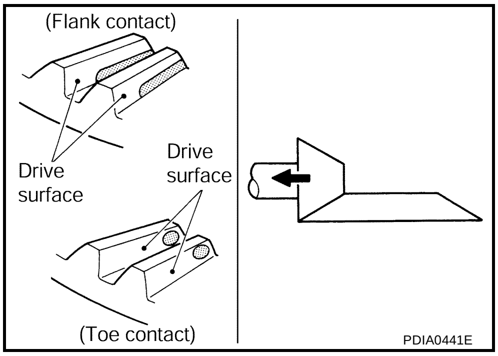
SDIA0517E

- If the tooth contact is near the face (face contact), or near the heal (heel contact), thicken drive pinion gear adjusting shims to move drive pinion closer to drive gear.
  Refer to RFD-35, "Drive Pinion Adjusting Shim" .



PDIA0440E

- If the tooth contact is near the flank (flank contact), or near the toe (toe contact), thin drive pinion gear adjusting shims to move drive pinion farther from drive gear.
  Refer to RFD-35, "Drive Pinion Adjusting Shim" .



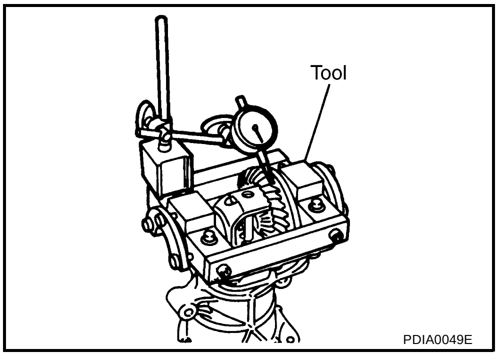
Backlash

1. Remove rear cover. Refer to RFD-22, "Differential Assembly" .
2. Attach dummy cover set. For dummy cover installation, refer to RFD-17, "Drive Gear Runout" .

   Tool number : KV381086S1 (—)

3. Fit a dial indicator to the drive gear face to measure the backlash.

   Backlash: 0.10 - 0.15 mm (0.0039 - 0.0059 in)



- If the backlash is outside of the specified value, change the thickness of side bearing adjusting shims.

  When the backlash is large:

  Make drive gear back adjusting shims thicker, and drive gear front adjusting shims thinner. Refer to RFD-35, "Side Bearing Adjusting Shim" .

  When the backlash is small:

  Make drive gear back adjusting shims thinner, and drive gear front adjusting shims thicker. Refer to RFD-35, "Side Bearing Adjusting Shim" .

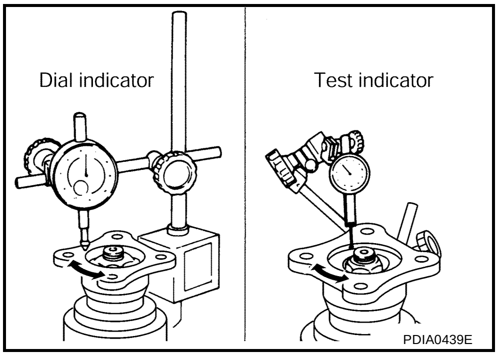
Companion Flange Runout

1. Fit a dial indicator onto the companion flange face (inner side of the propeller shaft mounting bolt holes).
2. Rotate companion flange to check for runout.

   Runout limit: 0.13 mm (0.0051 in) or less

3. Fit a test indicator to the inner side of companion flange (socket diameter).
4. Rotate companion flange to check for runout.

   Runout limit: 0.19 mm (0.0075 in) or less



5. If the runout value is outside the runout limit, follow the procedure below to adjust.

a. Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.

b. If the runout value is still outside of the limit after the phase has been changed, replace companion flange.

c. If the runout value is still outside of the limit after companion flange has been replaced, possible cause will be an assembly malfunction of drive pinion and electric controlled coupling, malfunctioning coupling bearing, or malfunctioning of electric controlled coupling.

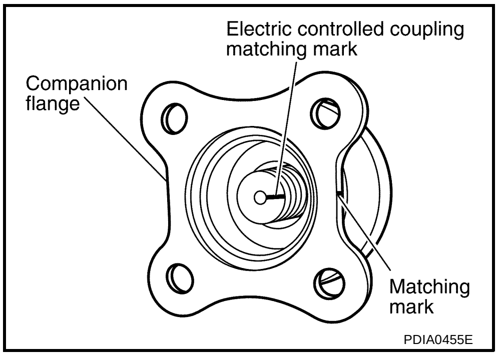
DISASSEMBLY

Electric Controlled Coupling Assembly

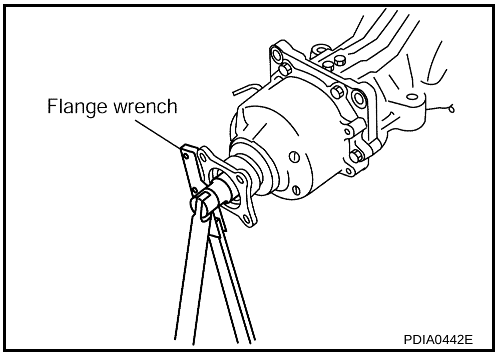
1. Remove connector bracket.
2. Put matching mark on the thread edge of electric controlled coupling. The matching mark should be in line with the matching mark on companion flange.

   CAUTION:
   For matching mark, use paint. Do not damage electric controlled coupling.

   NOTE:
   When replacing electric controlled coupling, matching mark is not necessary.

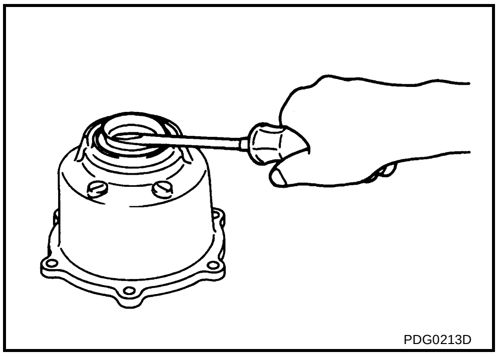


3. Remove companion flange lock nut, using a flange wrench.
4. Remove companion flange.
5. Remove coupling cover.

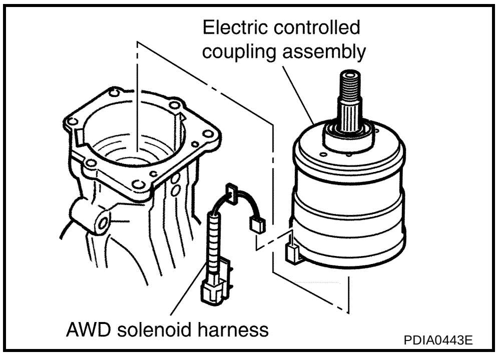


6. Remove front oil seal from coupling cover, using flat-bladed screwdriver.

   CAUTION:
   Be careful not to damage coupling cover.

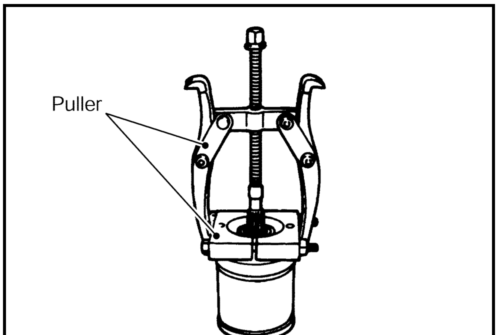


7. Remove electric controlled coupling assembly from drive pinion in gear carrier.
8. Remove AWD solenoid harness.



A B C RFD E F G H I J K L M

9. Remove coupling front bearing, using pullers and then take off bearing shim from electric controlled coupling.
10. Remove center oil seal from gear carrier.

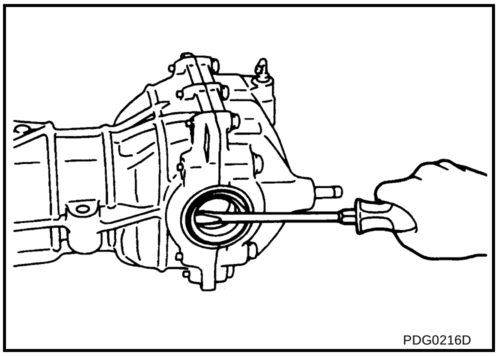


PDIA0444E

Differential Assembly

1. Remove side oil seal from gear carrier and rear cover, using flat-bladed screwdriver.

   CAUTION:
   Be careful not to damage gear carrier and rear cover.
2. Remove rear cover mounting bolts.

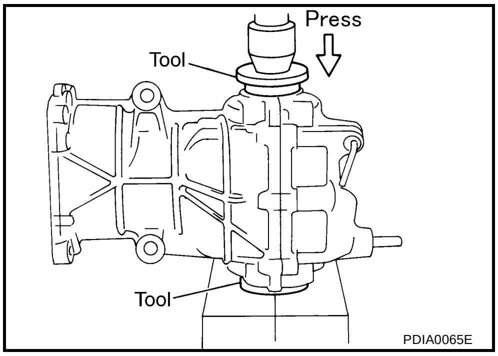

PDG0216D

3. Set drifts to the right and left side bearing adjusting shims individually. Press differential case assembly with side bearing to remove gear carrier assembly and rear cover assembly.

   Tool number : KV40100610 (J-26089)

   CAUTION:
   The pressure shall be as low as possible to remove gear carrier assembly and rear cover assembly. The maximum pressure shall be 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

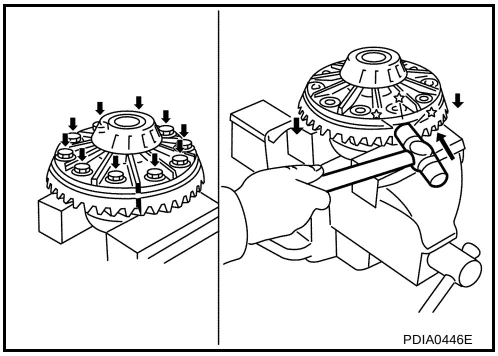
   NOTE:
   Differential case assembly, side bearings, and adjusting shims are compressed and integrated in gear carrier and rear cover.



PDIA0065E

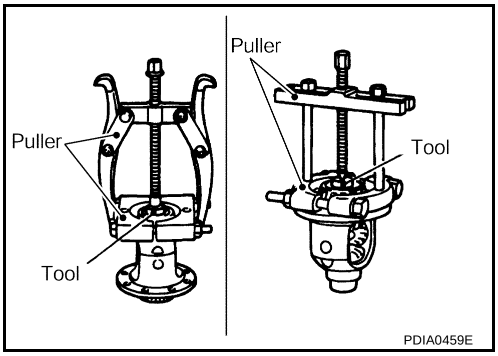
4. Remove drain plug and filler plug.
5. Remove side bearing adjusting shims and side bearing outer races.

   CAUTION:
   Mark the side bearing adjusting shims so that the original mounting positions (right/left) can be identified later.
6. Remove drive gear mounting bolts and then remove drive gear from differential case.


PDIA0446E

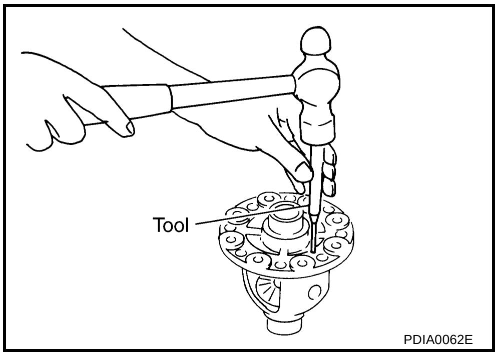
7. Remove side bearing inner races, using pullers and the drift.

   Tool number : ST33052000 (—)

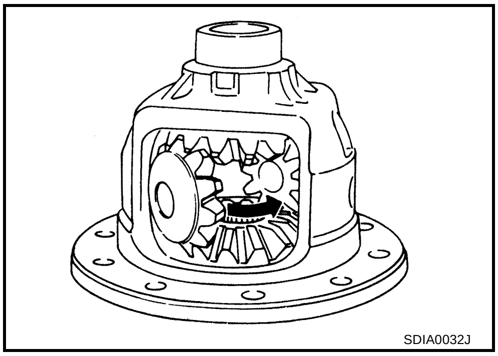


8. Pull the lock pin out of pinion mate shaft, using the pin punch.

   Tool number : ST23550000 (—)



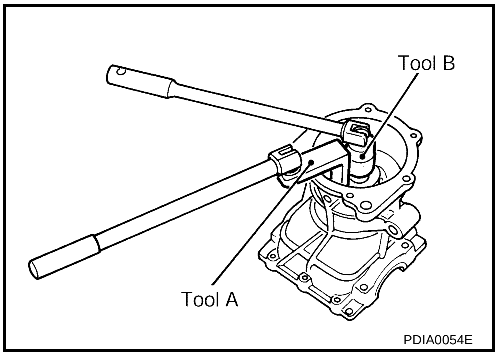
9. Remove pinion mate shaft, pinion mate gears, pinion mate thrust washers, side gears, side gear thrust washers from differential case.



Drive Pinion Assembly

1. Remove electric controlled coupling assembly. Refer to RFD-21, "Electric Controlled Coupling Assembly" .
2. Remove differential case assembly. Refer to RFD-22, "Differential Assembly" .
3. Fit drive pinion socket onto drive pinion spline. Remove drive pinion nut, using the pinion nut wrench.

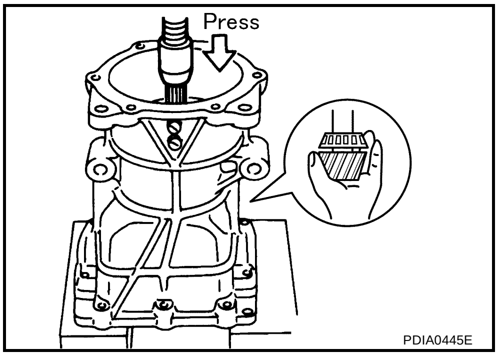
   Tool number A: KV38108400 (—)
   B: KV38108500 (—)



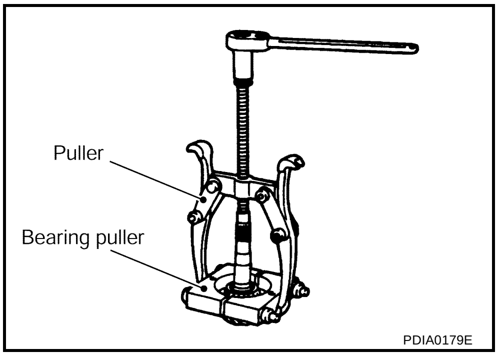
4. Press drive pinion assembly out of gear carrier.

   CAUTION:

   Do not drop drive pinion assembly.
5. Remove pinion front bearing inner race.
6. Remove collapsible spacer.



7. Remove pinion rear bearing inner race from drive pinion, using pullers.



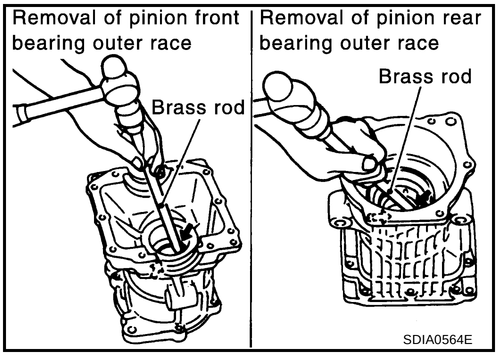
8. Using a brass rod, tap pinion front bearing outer race evenly from the 2 cutouts on gear carrier and remove pinion front bearing outer race.

   CAUTION:

   Be careful not to damage gear carrier.
9. Using a brass rod, tap drive pinion adjusting shim evenly from the 2 cutouts on gear carrier and remove drive pinion adjusting shims and pinion rear bearing outer race.

   CAUTION:

   Be careful not to damage the gear carrier.



INSPECTION AFTER DISASSEMBLY

Clean up the disassembled parts. Then, inspect if the parts are worn or damaged. If so, follow the measures below.

Content	Conditions and Measures
Hypoid gear	● If the gear teeth do not mesh or line-up correctly, determine the cause and adjust or replace as necessary. ● If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.
Bearing	● If any chipped (by friction), pitted, worn, rusted or scratched mark, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).
Side gear and Pinion mate gear	● If any cracks or damage on the surface of the tooth is found, replace. ● If any worn or chipped mark on the contact sides of the thrust washer is found, replace.
Side gear thrust washer and pinion mate thrust washer	● If it is chipped (by friction), damaged, or unusually worn, replace.
Oil seal	● Whenever disassembled, replace. ● If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.
Differential case	● If any wear or crack on the contact sides of the differential case is found, replace.
Companion flange	● If any chipped mark (about 0.1 mm, 0.004 in) or other damage on the contact sides of the lips of the companion flange is found, replace.

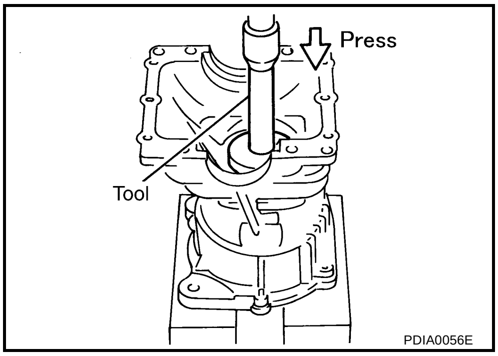
ASSEMBLY

Drive Pinion Assembly

1. Install a drive pinion adjusting shim of the same thickness as was installed prior to disassembly. Press pinion rear bearing outer race into gear carrier, using the drift.

   Tool number : ST17130000 (—)

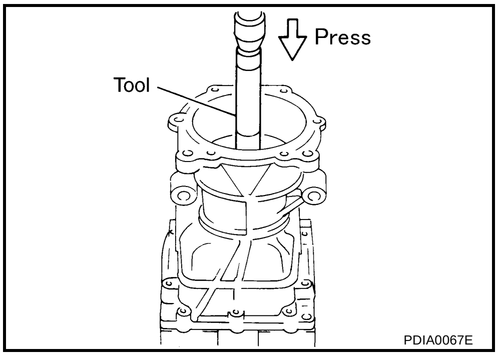
   CAUTION:
   - **At first, using a hammer, tap bearing outer race until it becomes flush to gear carrier.**
   - **Do not reuse pinion rear bearing outer race.**



2. Press pinion front bearing outer race into gear carrier, using the drift.

   Tool number : ST33230000 (J-25805-01)

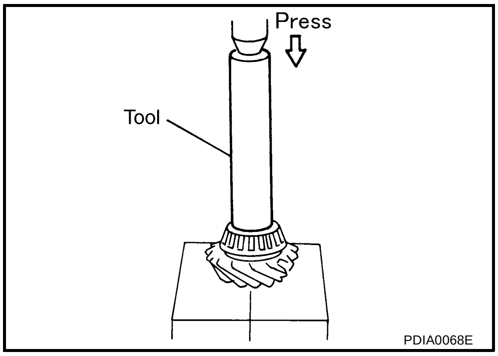
   CAUTION:
   - **At first, using a hammer, tap bearing outer race until it becomes flush to gear carrier.**
   - **Do not reuse pinion front bearing outer race.**



3. Press pinion rear bearing inner race to drive pinion, using the drift.

   Tool number : ST23860000 (—)

   CAUTION:
   Do not reuse pinion rear bearing inner race.



4. After checking and adjusting the tooth contact and backlash of the hypoid gear following the procedure below.

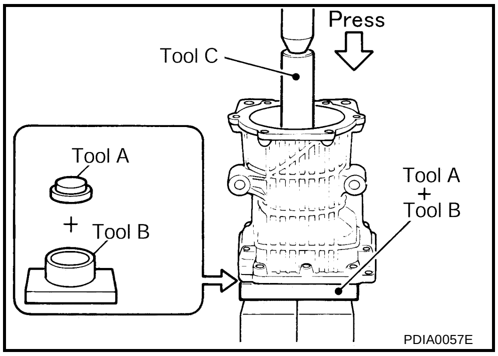
a. Apply gear oil to the drive pinon rear bearing, and assemble the drive pinion to the gear carrier.

   CAUTION:
   Do not assemble a collapsible spacer.

b. Apply gear oil to drive pinon front bearing, and assemble pinion front bearing inner race to drive pinion. Using the drifts and press stand, press pinion front bearing inner race to drive pinon as far as drive pinion nut can be tightened.

   Tool number A: KV40100610 (J-26089)
   B: ST38220000 (—)
   C: ST23860000 (—)

   CAUTION:
   Do not reuse pinion front bearing inner race.



c. Temporarily tighten removed drive pinon nut to drive pinion.

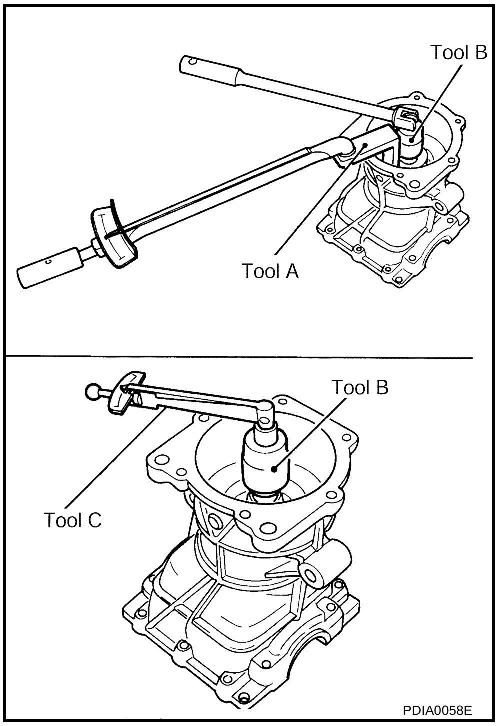
   NOTE:
   Use removed drive pinon nut only for the preload measurement.

d. Fit the drive pinon socket onto the drive pinion spline. Using the pinon nut wrench, tighten drive pinon nut to the specified preload torque.

Tool number **A: KV38108400 (—)**
B: KV38108500 (—)
C: ST3127S000 (J-25765-A)

Drive pinion bearing preload:
0.69 - 1.17 N·m (0.07 - 0.11 kg-m, 7 - 10 in-lb)

CAUTION:
Drive pinon nut is tightened with no collapsible spacer. Be careful not to overtighten it. While measuring the preload, tighten it by 5° to 10°.

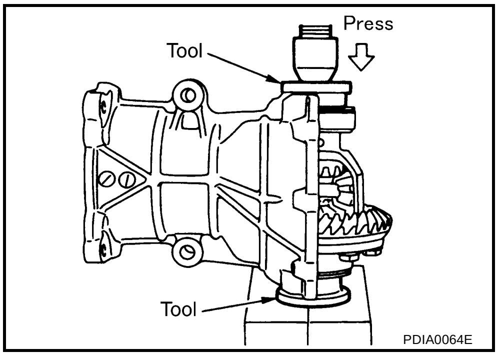


PDIA0058E

e. Apply gear oil to side bearings, and install new side bearing adjusting shims with the same thickness or re-install the old ones to the same mounting position they were in prior to disassembly. Install differential case assembly to gear carrier.

Tool number : KV40100610 (J-26089)

CAUTION:
- **The drifts shall be placed on the center of the adjusting shims.**
- **The pressure shall be as low as possible to install gear carrier assembly to differential assembly. The maximum pressure shall be 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**
- **If adjusting shims are installed by tapping, gear carrier may be damaged. Avoid tapping.**

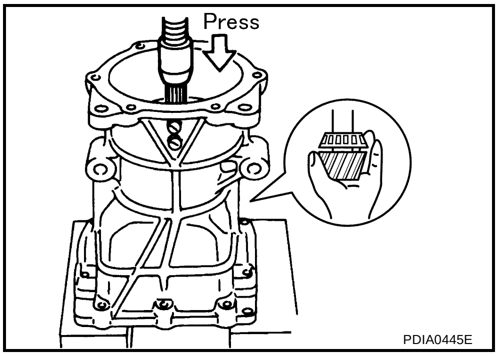


PDIA0064E

f. Check and adjust the tooth contact. Refer to RFD-18, "Tooth Contact" .
g. Check and adjust the backlash. Refer to RFD-20, "Backlash" .
h. Remove dummy cover set, and remove differential case assembly.
i. Remove drive pinion nut and press drive pinion assembly out of gear carrier.

CAUTION:
Do not drop drive pinion assembly.

j. Remove pinion front bearing inner race.

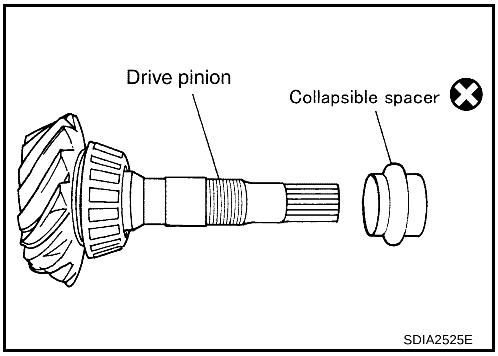


PDIA0445E

5. Assemble collapsible spacer to drive pinion.

CAUTION:

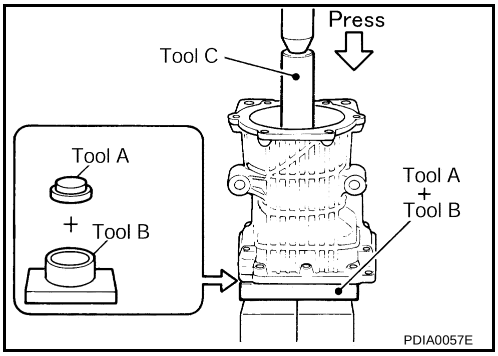
- **Be careful of the mounting direction of collapsible spacer.**
- **Do not reuse collapsible spacer.**



6. Apply gear oil to drive pinon front bearing, and assemble pinion front bearing inner race to drive pinion. Using the drifts and press stand, press the pinion front bearing inner race to drive pinon as far as drive pinion nut can be tightened.

Tool number	**A: KV40100610 (J-26089)**
	B: ST38220000 (—)
	C: ST23860000 (—)

CAUTION:
Do not reuse pinion front bearing inner race.



7. Apply anti-corrosive oil to the thread and seat of drive pinion nut, and temporarily tighten drive pinion nut to drive pinion.

CAUTION:
Do not reuse drive pinion nut.

8. Fit drive pinon socket onto drive pinion spline. Using the pinon nut wrench, adjust the drive pinion nut tightening torque and pinion bearing preload torque.

Tool number	**A: KV38108400 (—)**
	B: KV38108500 (—)
	C: ST3127S000 (J-25765-A)

Drive pinion nut tightening torque:

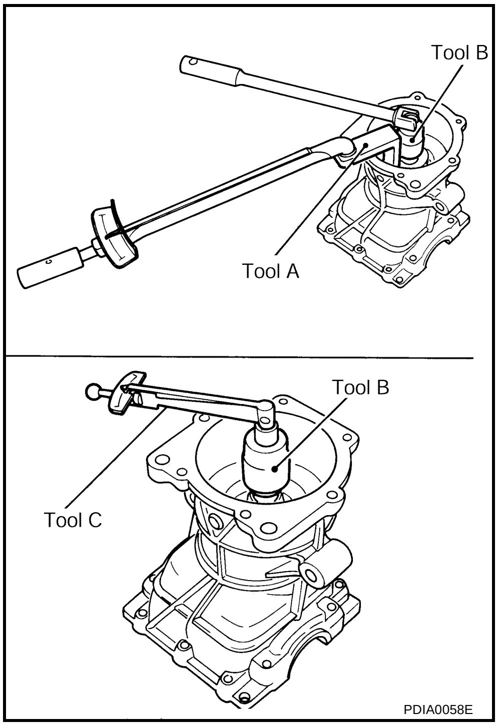
98 - 431 N·m (10 - 43 kg-m, 73 - 317 ft-lb)

Drive pinion bearing preload:

0.69 - 1.17 N·m (0.07 - 0.11 kg-m, 7 - 10 in-lb)

CAUTION:

- **Adjust the lower limit of the drive pinion nut tightening torque first.**
- **If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion nut to adjust the preload torque.**
- **After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.**



9. Install differential case assembly. Refer to RFD-28, "Differential Assembly" .

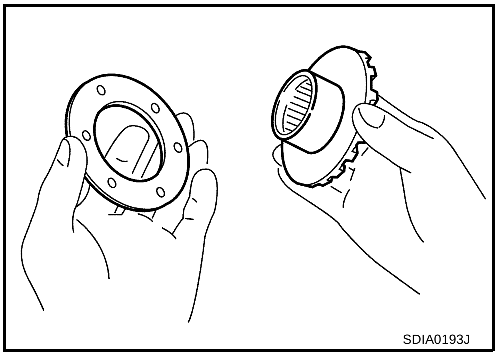
CAUTION:
Do not install rear cover.

10. Install dummy cover set, and check drive gear runout, tooth contact, and backlash. Refer to RFD-17, "Drive Gear Runout" , RFD-18, "Tooth Contact" , RFD-20, "Backlash" .
11. Remove dummy cover set, then install rear cover, and side oil seal. Refer to RFD-28, "Differential Assembly" .

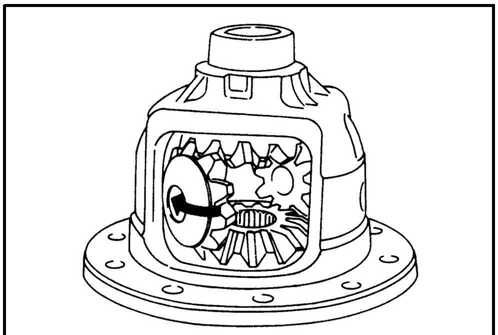
12. Check total preload torque. Refer to RFD-17, "Total Preload Torque" .
13. Install electric controlled coupling assembly. Refer to RFD-31, "Electric Controlled Coupling Assembly" .
14. Check companion flange runout. Refer to RFD-20, "Companion Flange Runout" .

Differential Assembly

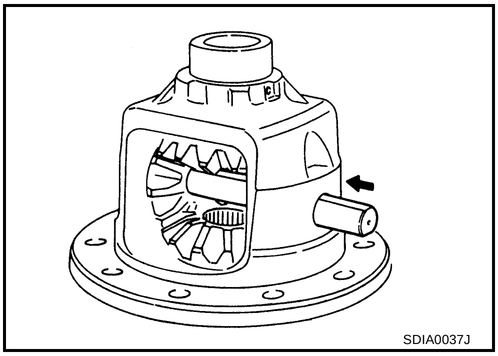
1. Install side gear thrust washers with the same thickness as the ones installed prior to disassembly or reinstall the old ones on the side gears.
2. Install side gear and thrust washer into differential case.


SDIA0193J

3. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.

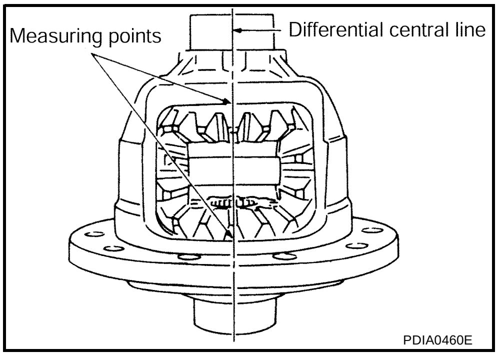

SDIA0036J

4. Align the lock pin holes on differential case with shaft, and install pinion mate shaft.


SDIA0037J

5. Measure side gear end play following the procedure below, and select the appropriate side gear thrust washers.

a. Place differential case straight up so that side gear to be measured comes upward.



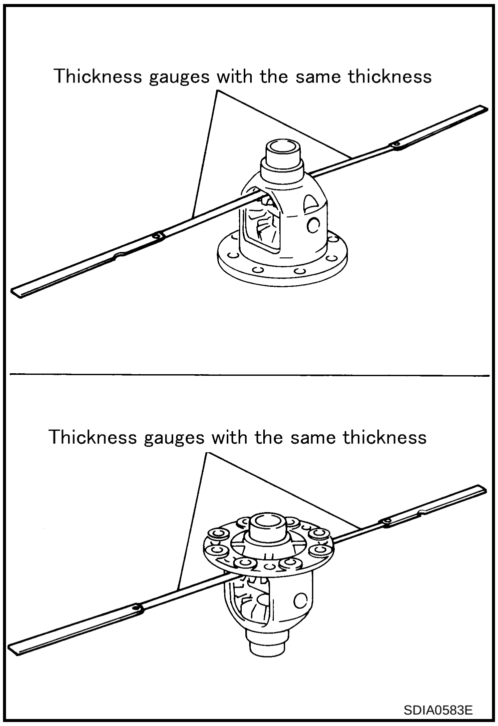
PDIA0460E

b. Using thickness gauges, measure the clearance between side gear back and differential case at 3 different positions, while rotating side gear. Average the 3 readings, and then measure the clearance. (Measure the clearance of the other side as well.)

Side gear back clearance specification:

0.2 mm (0.008 in) or less.
(Each gear should rotate smoothly without excessive resistance during differential motion.)

CAUTION:
To prevent side gear from tilting, insert thickness gauges with the same thickness from both sides.



c. If the back clearance is outside the specification, use a thicker/ thinner side gear thrust washer to adjust. Refer to RFD-34, "Side Gear Thrust Washer" .

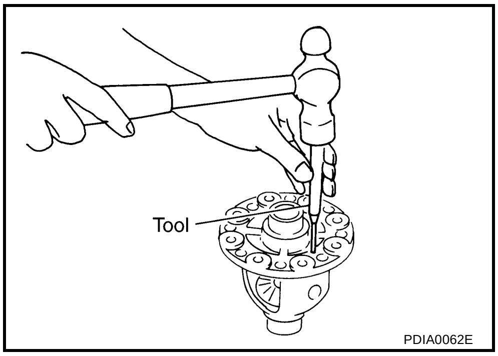
When the back clearance is large:
Use a thicker thrust washer.
When the back clearance is small:
Use a thinner thrust washer.

CAUTION:
Select a side gear thrust washer for right and left individually.

6. Drive a lock pin into pinion mating shaft, using the pin punch.

Tool number : ST23550000 (—)

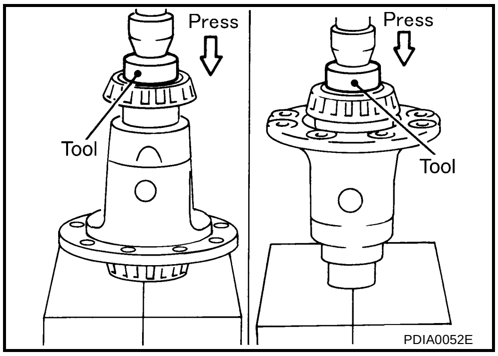
CAUTION:
Do not reuse lock pin.



7. Press side bearing inner races to differential case, using the drift.

Tool number : KV40105020 (—)

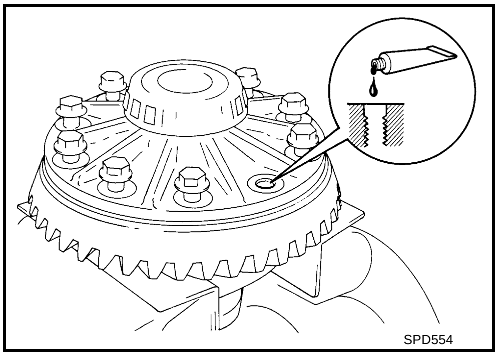
CAUTION:
Do not reuse side bearing inner race.



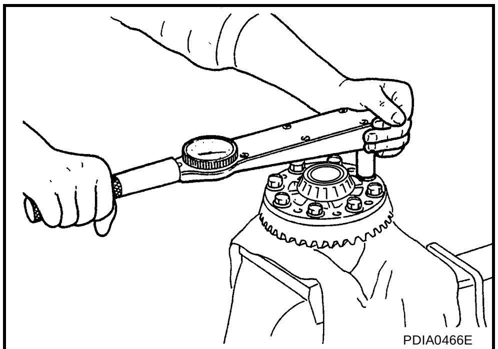
8. Apply thread locking sealant into the thread hole of drive gear.

- **Use Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-48, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .**

CAUTION:
The drive gear back and threaded holes shall be cleaned and decreased sufficiently.



9. Install drive gear to the differential case, and apply anti-corrosive oil onto threads and seats on the mounting bolts, and then tighten to the specified torque. Refer to RFD-16, "COMPONENTS" .



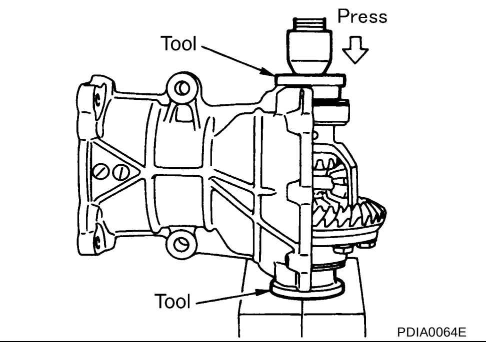
PDIA0466E

10. Apply gear oil to side bearings, and install new side bearing adjusting shims (2 pieces for one side) with the same thickness as the ones installed prior to disassembly or re-install the old ones, with side bearing outer race to differential case.
If side bearing adjusting shims have been already selected, use them.

CAUTION:

Do not reuse side bearing outer race.

11. Set the drifts to the right and left side bearing adjusting shims individually. Compress differential case assembly and side bearing to install gear carrier assembly to differential case assembly.



PDIA0064E

Tool number : KV40100610 (J-26089)

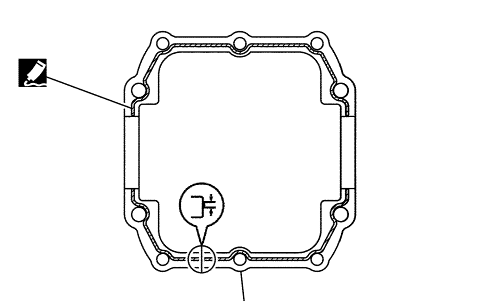
CAUTION:

- **The drift shall be placed on the center of the adjusting shims.**
- **The pressure shall be as low as possible to install differential assembly into gear carrier assembly. The maximum pressure shall be 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**
- **If the adjusting shims are installed by tapping, the gear carrier may be damaged. Avoid tapping.**

12. Install dummy cover set, check and adjust drive gear runout, tooth contact, backlash, and total preload torque. Refer to RFD-17, "Drive Gear Runout" , RFD-18, "Tooth Contact" , RFD-20, "Backlash" , RFD-17, "Total Preload Torque" .
13. Remove dummy cover set.
14. Apply liquid gasket to mating surface of rear cover. Overlap both ends of the bead for at least 3 mm (0.12 in).
   - **Use Genuine Silicone RTV or equivalent. Refer to GI-48, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .**

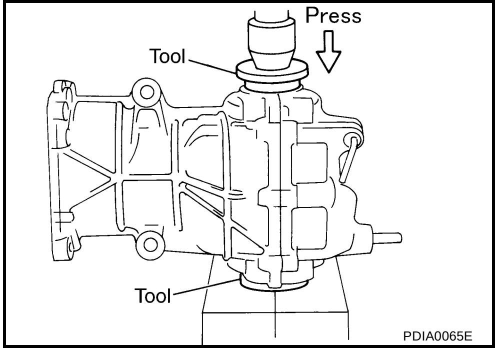
CAUTION:

Remove old sealant adhering to the mounting surfaces. Also remove any moisture, oil, or foreign material adhering to the mounting surfaces.



PDIA0447E

15. Set the drifts to the right and left side bearing adjusting shims individually. Compress differential case assembly and side bearing to install rear cover.



PDIA0065E

Tool number : KV40100610 (J-26089)

CAUTION:

- **The drift shall be placed on the center of the adjusting shims.**
- **The pressure shall be as low as possible to install the rear cover. The maximum pressure shall be 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**
- **If rear cover is forced in by tapping, rear cover may be damaged by adjusting shims. Avoid tapping.**

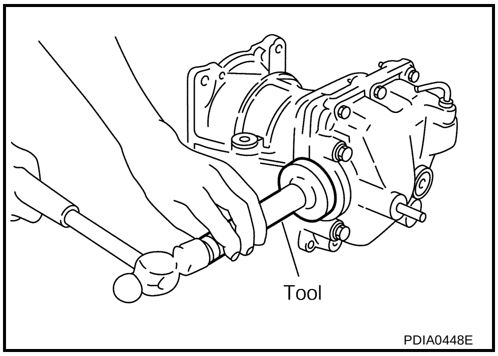
16. Tighten rear cover mounting bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .

17. Using the drift, drive side oil seals until it becomes flush with the case end.

Tool number : KV38100200 (J-26233)

CAUTION:
- **Do not reuse oil seal.**
- **When installing, do not incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**

18. Check total preload torque. Refer to RFD-17, "Total Preload Torque" .

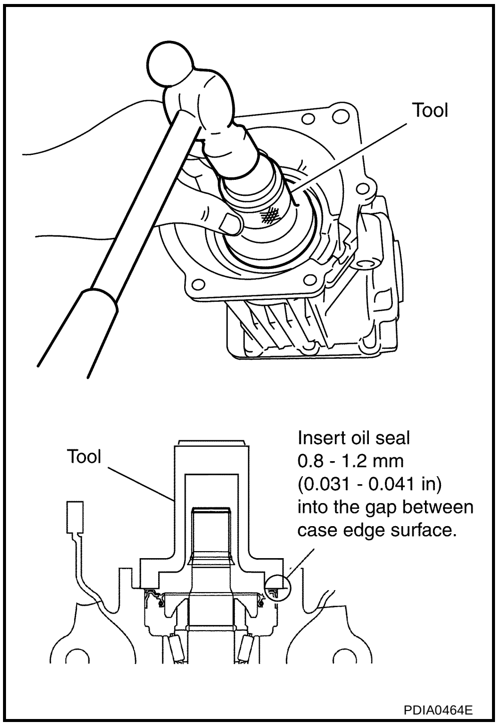


Electric Controlled Coupling Assembly

1. Using the drift, install center oil seal as shown in the figure.

Tool number : ST35271000 (J-26091)

CAUTION:
- **Do not reuse the oil seal.**
- **When installing, do not incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**

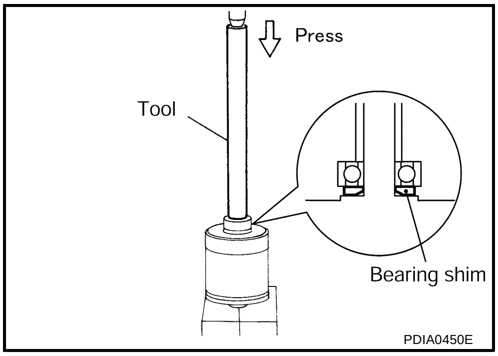


2. Install bearing shim and coupling front bearing to electric controlled coupling, using the drift.

Tool number : ST22360002 (J-25679-01)

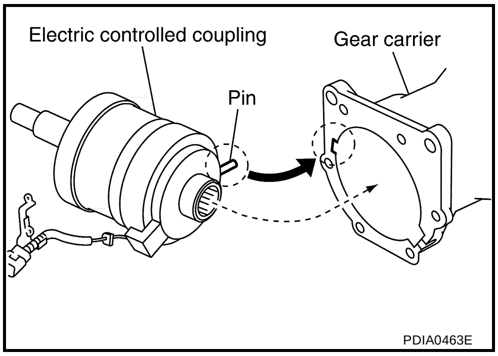
CAUTION:
When assembling bearing shim, shim chamfer side should face electric controlled coupling side.

3. Connect AWD solenoid harness to electric controlled coupling.



4. Install electric controlled coupling to drive pinion.

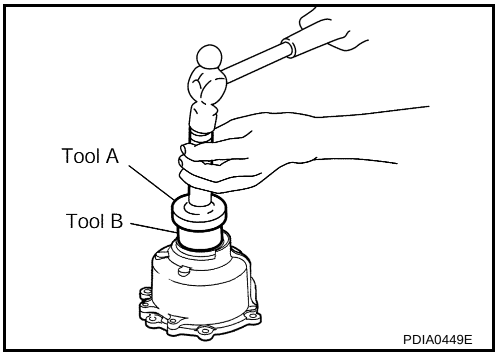
   CAUTION:
   - **Align the pin on electric controlled coupling with the groove of gear carrier.**
   - **Be careful not to damage center oil seal.**
5. Set AWD solenoid harness guide to gear carrier.



6. Using the drifts, drive front oil seal until it becomes flush with the case end.

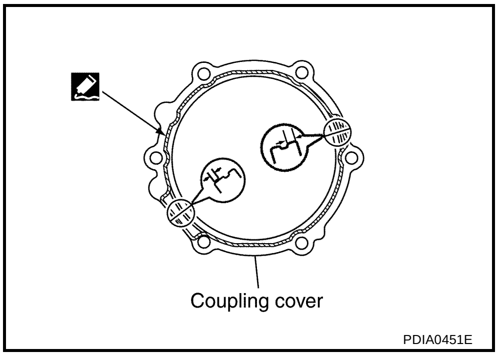
   Tool number **A: KV38100200 (J-26233)**
   B: ST27861000 (—)

   CAUTION:
   - **Do not reuse oil seal.**
   - **When installing, do not incline oil seal.**
   - **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**

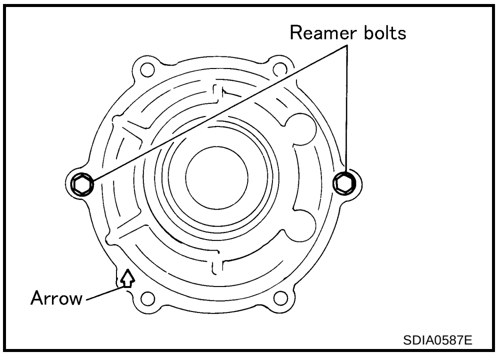


7. Apply liquid gasket to mating surface of coupling cover. Overlap both ends of the bead for at least 3 mm (0.12 in).
   - **Use Genuine Silicone RTV or equivalent. Refer to** GI-48, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" **.**

   CAUTION:
   Remove old sealant adhering to the mounting surfaces. Also remove any moisture, oil, or foreign material adhering to the mounting surfaces.

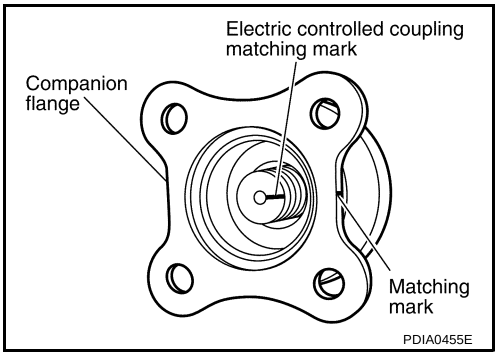


8. Install coupling cover to gear carrier with the arrow facing upward, temporarily tighten reamer bolts to the positions shown in the figure.
9. Tighten reamer bolts and coupling cover mounting bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .



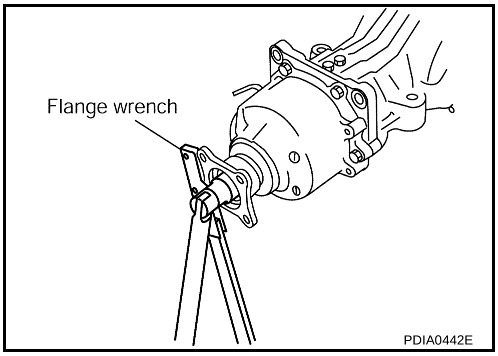
10. Install companion flange.

    NOTE:
    When reusing electric controlled coupling, align the matching mark of electric controlled coupling with the matching mark of companion flange, then install companion flange.



11. Install companion flange lock nut using a flange wrench, tighten to the specified torque. Refer to RFD-16, "COMPONENTS" .

    CAUTION:
    Do not reuse companion flange lock nut.
12. Check companion flange runout. Refer to RFD-20, "Companion Flange Runout" .
13. Install connector bracket, and tighten bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

ADS0016A

Applied model	QR25DE
Final drive model	R145
Gear ratio	2.466
Number of teeth (Drive gear/Drive pinion)	37/15
Oil capacity (Approx.) ℓ (US pt, Imp pt)	0.55 (1-1/8, 1)
Number of pinion gears	2
Drive pinion adjustment spacer type	Collapsible

Inspection and Adjustment

ADS0018F

DRIVE GEAR RUNOUT

Unit: mm (in)

Item	Runout limit
Drive gear back face	0.05 (0.0020) or less

DIFFERENTIAL SIDE GEAR CLEARANCE

Unit: mm (in)

Item	Specification
Side gear backlash (Clearance between side gear and differential case)	0.2 (0.008) or less. (Each gear should rotate smoothly without excessive resistance during differential motion.)

PRELOAD TORQUE

Unit: N·m (kg-m, in-lb)

Item	Specification
Pinion bearing (P_1)	0.69 - 1.17 (0.07 - 0.11, 7 - 10)
Side bearing (P_2)	0.64 - 0.98 (0.07 - 0.09, 6 - 8)
Side bearing to pinion bearing (Total preload) (Total preload = P_1 + P_2)	1.33 - 2.15 (0.14 - 0.21, 12 - 19)

BACKLASH

Unit: mm (in)

Item	Specification
Drive gear to drive pinion gear	0.10 - 0.15 (0.0039 - 0.0059)

COMPANION FLANGE RUNOUT

Unit: mm (in)

Item	Runout limit
Companion flange face	0.13 (0.0051) or less
Inner side of the companion flange	0.19 (0.0075) or less

SELECTIVE PARTS

Side Gear Thrust Washer

Unit: mm (in)

Thickness	Part number*	Thickness	Part number*
0.74 (0.0291) 0.77 (0.0303) 0.80 (0.0315)	38424 4N200 38424 4N201 38424 4N202	0.83 (0.0327) 0.86 (0.0339)	38424 4N203 38424 4N204

*: Always check with the Parts Department for the latest parts information.

Drive Pinion Adjusting Shim

Unit: mm (in)

Thickness	Part number*	Thickness	Part number*
1.70 (0.0669)	38154 4N200	2.00 (0.0787)	38154 4N210
1.73 (0.0681)	38154 4N201	2.03 (0.0799)	38154 4N211
1.76 (0.0693)	38154 4N202	2.06 (0.0811)	38154 4N212
1.79 (0.0705)	38154 4N203	2.09 (0.0823)	38154 4N213
1.82 (0.0717)	38154 4N204	2.12 (0.0835)	38154 4N214
1.85 (0.0728)	38154 4N205	2.15 (0.0846)	38154 4N215
1.88 (0.0740)	38154 4N206	2.18 (0.0858)	38154 4N216
1.91 (0.0752)	38154 4N207	2.21 (0.0870)	38154 4N217
1.94 (0.0764)	38154 4N208	2.24 (0.0882)	38154 4N218
1.97 (0.0776)	38154 4N209		

*: Always check with the Parts Department for the latest parts information.

Side Bearing Adjusting Shim

Unit: mm (in)

Thickness	Part number*	Thickness	Part number*
1.85 (0.0728)	38453 4N200	2.05 (0.0807)	38453 4N204
1.90 (0.0748)	38453 4N201	2.10 (0.0827)	38453 4N205
1.95 (0.0768)	38453 4N202	2.15 (0.0854)	38453 4N206
2.00 (0.0787)	38453 4N203	2.20 (0.0866)	38453 4N207

*: Always check with the Parts Department for the latest parts information.